

WHAT IS CLAIMED IS:

1. A filtration system comprising a membrane module, a junction, a gas source, and a liquid source, wherein the membrane module comprises a plurality of porous hollow fiber membranes, wherein a first end of each hollow fiber membrane is mounted in an upper potting head, wherein a second end of each hollow fiber membrane is mounted in a lower potting head, wherein the lower potting head comprises a plurality of aeration openings, wherein the junction is connected to at least one of the gas source and the liquid source, and wherein the junction is configured to inject a liquid flow having entrained therein a plurality of gas bubbles into a cavity below the lower potting head.

2. The filtration system according to claim 1, wherein the junction is connected to the gas source and the liquid source.

3. The filtration system according to claim 1, wherein the lower potting head is mounted in a sleeve that forms the cavity below the lower potting head.

4. The filtration system according to claim 1, wherein the junction is connected to the membrane module.

5. The filtration system according to claim 1, wherein the junction is adjacent to the membrane module, but not connected to the membrane module.

6. The filtration system according to claim 1, wherein the junction is selected from the group consisting of a venturi tube, a jet, a nozzle, an ejector, an eductor, and an injector.

7. The filtration system according to claim 1, wherein the gas bubbles are entrained or injected into the liquid by at least one device which forcibly mixes a gas into the liquid to produce a mixture of liquid and gas bubbles.

8. The filtration system according to claim 1, wherein the gas is selected from the group consisting of air, oxygen, gaseous chlorine, and ozone.

9. The filtration system according to claim 1, further comprising an aerobic basin.

10. The filtration system according to claim 9, wherein the membrane module is at least partially immersed in the aerobic basin.

11. The filtration system according to claim 9, further comprising a tank separate from the aerobic basin, wherein the membrane module is at least partially immersed in the tank.

12. The filtration system according to claim 1, wherein the membranes are arranged in close proximity to one another and mounted to prevent excessive movement therebetween.

13. The filtration system according to claim 1, further comprising a source of a cleaning chemical.

14. The filtration system according to claim 1, wherein the junction is connected to the source of the cleaning chemical.

15. The filtration system according to claim 1, wherein the liquid source is connected to the source of the cleaning chemical.

16. The filtration system according to claim 1, wherein the membrane module further comprises a partition, wherein the partition extends between the porous hollow fiber membranes, thereby partitioning the porous hollow fiber membranes into groups.

17. The filtration system according to claim 16, wherein the partition is formed by a spacing between the groups.

18. The filtration system according to claim 16, wherein the porous hollow fiber membranes are arranged in a cylindrical array and a plurality of partitions extend radially from a center of the array or are positioned concentrically within the cylindrical array.

19. The filtration system according to claim 1, wherein the porous hollow fiber membranes are arranged in close proximity to one another to form a bundle.

20. The filtration system according to claim 19, wherein the bundle comprises a central longitudinal passage extending a length of the bundle between the upper potting head and the lower potting head.

21. The filtration system according to claim 19, wherein the bundle is situated adjacent to an aeration opening.

22. The filtration system according to claim 1, wherein at least one aeration opening comprises a slot.

23. The filtration system according to claim 1, wherein at least one aeration opening comprises a row comprising a plurality of holes.

24. The filtration system according to claim 1, wherein the membrane module comprises a plurality of bundles of hollow fiber membranes, and wherein the aeration openings are positioned to coincide with spaces formed between the bundles.

25. The filtration system according to claim 1, wherein the aeration openings have an average diameter or an average equivalent diameter of from about 1 mm to about 40 mm.
26. The filtration system according to claim 1, wherein the porous hollow fiber membranes have a packing density of from about 5% to about 70%.
27. The filtration system according to claim 1, wherein an average inner diameter of the porous hollow fiber membranes is from about 0.1 mm to about 5 mm.
28. The filtration system according to claim 1, wherein an average wall thickness of the porous hollow fiber membranes is from about 0.05 to about 2 mm.
29. The filtration system according to claim 1, wherein the system comprises a bioreactor.
30. The filtration system according to claim 29, wherein the membrane module is suspended vertically within a tank.
31. The filtration system according to claim 30, wherein the tank further comprises a feed inlet.
32. The filtration system according to claim 29, further comprising an additional source of aeration situated beneath the membrane module.
33. The filtration system according to claim 32, wherein the additional source of aeration comprises a group of air permeable tubes or gas distributors.
34. The filtration system according to claim 29, further comprising a source of oxygen for forming an activated sludge within the bioreactor.
35. The filtration system according to claim 29, further comprising an activated sludge.
36. The filtration system according to claim 29, further comprising a pump for withdrawing a filtrate from at least one end of the porous hollow fiber membranes.